CLAIMS

1. Process for the automatic rectification of images, wherein at least one image is rectified by a mapping function onto a reference image (R), and at least some parameters of the mapping function are unknown, comprising at least:

an extraction of at least three objects (O1-O3) from the image (O);

a determination of at least three control points in the image, where characteristic points of the extracted objects are determined as control points;

an assignment of the objects (O1-O3) to objects (O1'-O3') in the reference image, where the objects in the two images are assigned on the basis of the similarity between the objects and/or on the basis of a vector grid, and the vector grid is formed by the connections between the characteristic object points; and

a selection of a suitable mapping function and/or an adjustment of the parameters of the mapping function, whereby the mapping function is changed by changing the parameters in such a way that the cumulative error in the positional differences between the projected control points and the corresponding points in the reference image is minimized.

2. Process according to claim 1, comprising the generation of weighted control points, where a control point structure comprising a limited number of pixels is formed around a control point of the image and/or of the reference image; the control point structure is projected by the mapping function onto the other image serving as the image structure so that it can be seen whether there is also a corresponding image structure of sufficient quality there as well, where a quality of the control point structure is described at least in terms of its variability, directional contrast, and/or similarity, and a weighting of the control points is determined on the basis of this quality.

3. Process according to claim 2, comprising an adjustment of the position of the control point in the image and/or in the reference image, where, for at least one channel, the form of a gray-scale value distribution of the control point structure in the reference image and the form of the a gray-scale value distribution of the image structure in the image are adjusted to each other, whereby, in the image and/or in the reference image, at least one difference between the gray-scale values of two adjacent pixels of the control point structure and at least one difference between gray-scale values of the corresponding pixels in the image structure is found, an error value being derived from the difference between these two differences, with the less-resolved structure component being mapped onto the more highly resolved structure component, and with the control point structure in the image and/or in the reference image being shifted in the vertical and/or horizontal direction to determine the error for the new position.

4. Process according to claim 2 or claim 3, comprising an adjustment of the parameters of the mapping function and/or a selection of a suitable mapping function, where the mapping function is changed by changing the parameters in such a way that the cumulative error of the positional differences between projected control points and the corresponding control points in the reference image is minimized under consideration of the weighting of the control points.

5. Process according to one of claims 1-4, comprising a compensating calculation by means of a correction function, wherein, for at least two control points, at least one vertical and one horizontal correction value is determined, which embody the positional difference between the projected control point and the corresponding control point in the reference image, and wherein the correction function is determined as a function of the correction values.

6. Process according to claim 5, comprising a projection of the corner coordinates of an image element onto image positions, wherein the image positions of the corner coordinates are

determined on the basis of the mapping function and the correction function.

7. Process according to claim 6, comprising a resampling, wherein the corner coordinates mark out a polygon, preferably a rectangle, and the gray-scale values enter into the final gray-scale value in correspondence with the percentage areas of all the image elements lying within the polygon.

8. Process according to one of claims 1-7, characterized in that the extraction comprises a classification and/or a geometric structure analysis, wherein

in the classification, the properties of the image are analyzed, and objects and/or areas of the same class membership are formed; and

in the geometric structure analysis, the edge contour of an object is determined on the basis of the contours of an area, and/or the objects are characterized numerically by means of a structure index.

9. Device for the automatic rectification of images, wherein at least one image can be rectified by a mapping function onto a reference image (R), and at least some of the parameters of the mapping function are unknown, comprising at least:

a module (1, 2) for extracting at least three objects (O1-O3) from the image (O);

a module (3) for determining at least three control points in the image, wherein characteristic points of the extracted objects can be determined as control points;

a module (4) for assigning the objects (O1-O3) to the objects (O1'-O3') in the reference image, where a correspondence between the objects in the two images is established on the basis of the similarity between objects and/or on the basis of a vector grid, the vector grid being formed by connecting characteristic object points; and

a selection module for selecting a suitable mapping function and/or for adjusting the

parameters of the mapping function, whereby the mapping function is changed by changing the parameters in such a way that the cumulative error sum of the positional differences between the projected control points and the corresponding points in the reference image is minimized.

10. Device according to claim 9, comprising a module (6) for generating weighted control points, by means of which a control point structure comprising a limited number of pixels is formed around a control point of the image and/or of the reference image; where the control point structure is mapped by the mapping function onto the other image serving as the image structure, where the quality of the control point structure are described at least in terms of variability, directional contrast, and/or similarity; and where the control points are weighted on the basis of this quality.

11. Device according to claim 10, comprising a module by means of which the position of the control point in the image and/or in the reference image can be adjusted, wherein the form of a gray-scale distribution of the control point structure and the form of the gray-scale distribution of the image structure can be adjusted to each other on at least one channel, wherein at least one difference between the gray-scale values of two adjacent pixels of the control point structure and at least one difference between the gray-scale values of the corresponding pixels of the image structure are formed, wherein from a difference between these two differences, an error is derived, wherein the less-resolved structure component is mapped onto the more highly resolved image component, and wherein the control point structure in the image and/or in the reference image are shifted in the vertical and/or in the horizontal direction to find the error value for the new position.

12. Device according to claim 10 or claim 11, comprising a module (7), by means of which the parameters of the mapping function are adjusted, wherein the mapping function is

changed by changing the parameters in such a way that the cumulative error of the positional differences between the control points and the associated projected image points is minimized under consideration of the weighting of the control points.

13. Device according to one of claims 9-12, comprising a module (8), by means of which a compensating calculation can be carried out, wherein, for each control point, at least one correction value in the vertical direction and one correction value in the horizontal direction can be determined, which correction values embody the deviation of the value of the mapping function from the value of the compensating function at the location of the control point.

14. Device according to one of claims 9-13, comprising a module (9), by means of which the corner coordinates of an image element can be mapped onto image positions, wherein the image positions of the corner coordinates can be determined on the basis of the mapping function and the correction function.

15. Device according to one of claims 9-14, comprising a module (10), by means of which a resampling can be performed, wherein the corner coordinates mark out a polygon, preferably a rectangle, and the gray-scale values determine the final gray-scale value in correspondence with the percentage areas of all the image elements lying within the polygon.

16. Device according to one of claims 9-15, characterized in that the extraction comprises a module (1) for a classification and/or a module (2) for a geometric structure analysis, wherein

in the classification process, the properties of the image can be analyzed and the objects and/or areas of the same class membership can be formed; and

in the geometric structure analysis, the edge contour of an object can be found from the edge contour of an area and/or an object can be numerically characterized by a structure index.